AS 1816—1990

Australian Standard®

Metallic materials—Brinell hardness test

This Australian Standard was prepared by Committee MT/6, Mechanical Testing of Metals. It was approved on behalf of the Council of Standards Australia on 21 June 1990 and published on 10 December 1990.

The following interests are represented on Committee MT/6:

Aluminium Development Council

Bureau of Steel Manufacturers of Australia

CSIRO, Division of Applied Physics

Confederation of Australian Industry

Department of Defence

Federal Chamber of Automotive Industries

Metal Trades Industry Association of Australia

National Association of Testing Authorities, Australia

Railways of Australia Committee

Society of Automotive Engineers—Australasia

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PREFACE

This Standard was prepared under the direction of the Standards Australia Committee on Mechanical Testing of Metals to supersede AS 1816, *Method for Brinell hardness test*, Part 1 — 1977: *Testing of metals*, and Part 2 — 1976: *Calibration of the testing machine*.

In this edition, the testing and calibration requirements have been combined into the one Standard for simplification and the avoidance of duplication.

This edition was prepared at the request of the National Association of Testing Authorities, Australia to alleviate problems associated with calibration in relation to cost, adequacy and range of hardness blocks available for user checks.

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STANDARDS AUSTRALIA

Australian Standard

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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard sets out methods for measuring the hardness of metals and metal products on scales of Brinell hardness. It includes requirements for the installation and calibration of the testing machine, and recommendations for its maintenance by the user.

NOTE: In some Brinell hardness testing machines, the indentation measuring apparatus is integral with the machine. In others, the function of the machine is limited to the indenting process, the measurement of the indentation being made separately. It is acceptable, therefore, for the indenting process to be performed in a compression testing machine which has suitable indenter attachments and which can apply the appropriate force in accordance with this Standard.

This Standard does not preclude the use of portable hardness testing machines which meet those requirements of Section 2 which are appropriate to non-portable machines.

1.2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS
1199 Sampling procedures and tables for inspection by attributes

1817 Method for Vickers hardness test
1817.1 Part 1: Testing of metals

2193 Methods for calibration and grading of force-measuring systems of testing machines

ISO
4964 Steel—Hardness conversions

1.3 DEFINITIONS For the purpose of this Standard, the definitions below apply.

1.3.1 Calibration—all the operations for determining the values of the errors of a Brinell hardness testing machine (and, if necessary, for determining other metrological properties).

1.3.2 Calibrating authority—any approved person or organization qualified and equipped to perform the tests set out in Sections 3 or 4 or both.

NOTE: The National Association of Testing Authorities, Australia, registers laboratories for performance of these calibrations.

1.3.3 Hardness test blocks—metal blocks made by a manufacturer recognized by the National Association of Testing Authorities, for the purpose of maintaining surveillance of the performance of hardness testing machines between periodic calibrations.

NOTE: This Standard permits the alternative use of user test blocks (test blocks manufactured and checked by the user) for checking the hardness machine performance when using ball diameters of 5 mm and 10 mm (see Clause 2.8.3).

1.3.4 Standard hardness blocks—metal blocks having a calibration traceable to a national standard scale of hardness which is recognized by the Australian standardizing authority, for the purpose of verifying the performance of hardness testing machines.

1.3.5 Standardizing authority—an authority which maintains the standard of Brinell hardness.

NOTE: In Australia the standardizing authority is the CSIRO, Division of Applied Physics, National Measurement Laboratory.

1.3.6 Test piece—a prepared piece for testing made from a test specimen by some mechanical operation.

1.3.7 Test specimen—a portion of material or a single item taken from the test sample for applying a particular test.

NOTE: Brinell hardness tests can be made on test pieces or test specimens, the latter often being in the form of finished products or components.

1.4 PRINCIPLE OF TEST The test consists of pressing a hardened steel ball or tungsten carbide ball of diameter, D, into the surface of a test piece and measuring the diameter of the indentation, d, left in the surface after removal of the test force F. The theoretical depth of indentation is designated as h (see Figure 1.1.)

The steel ball is used for materials with a Brinell hardness not exceeding 450 HB.

The tungsten carbide ball is used for materials with a Brinell hardness not exceeding 650 HB.

NOTE: The values obtained using a steel ball or a tungsten carbide ball are significantly different for hardnesses above 350 HB.